Name of the Examination: B. Tech (End Semester Exam, Year-2023)

Branch: Civil Engineering
Course Name: Design of Steel Structure
Time Allowed: 3 Hours

Semester: VI ${ }^{\text {th }}$
Course Code: CE-321
Maximum Marks: $\mathbf{5 0 . 0 0}$
(Note: All Questions are compulsory and distribution of marks are shown in all questions, Candidates can use their own steel tables and IS 800-2007 code)

Q-1 Design the slab base and the foundation for a column ISMB 325 subjected to an axial factored load of 900 kN and a factored bending moment @ major axis of 20 kNm . The base plate rests on concrete of grade M25 and the bearing capacity of hard soil is $500 \mathrm{kN} / \mathrm{m}^{2}$.
(10 Marks)
Q-2 Find the tensile strength of a single angle ISA $110 \times 110 \times 8 \mathrm{~mm}$ with one leg connected to gusset by means of three bolts of 22 mm da at pitch of $80 \mathrm{~mm} \mathrm{c} / \mathrm{c}$ in one line, $f_{y}=250 \mathrm{MPa}, f_{u}=410 \mathrm{MPa}$
(10 Marks)
Q-3 Find the Load carrying capacity of $2 \times$ ISLC 400 sections placed face to face over total width of 300 mm . Length of column is 3 m with both ends hinged. Also calculate to moment, shear, spacing of battens and effective depth of end and intermediate battens in the battening system for the above problem. Take $f_{y}=250 \mathrm{MPa}$.
(10 Marks)
Q-4(a) Calculate the moment carrying capacity of a laterally unrestrained ISMB 300 member of length 4 m .
(5 Marks)
(b)Design a simply supported beam (Laterally restrained) of span 6 m , carries, an imposed service load and dead load of $20 \mathrm{kN} / \mathrm{m}$ and $20 \mathrm{kN} / \mathrm{m}$ respectively. Assume Fe 410 grade steel.
(5 Marks)
Q-5 (a)A single-bolted double cover butt joint to connect two plates 6 mm thick as shown in Figure-1. Assuming, the bolts of 20 mm diameter at 60 mm pitch. Calculate the efficiency of the joint. Use 410 MPa Plates and 4.6 grade bolts (for 4.6 grade bolt, Yield stress $=240 \mathrm{MPa} \&$ Ultimate stress $=400 \mathrm{MPa}$ ).
( 5 Marks)

6 mm


Figure -1
(b) Determine the Plastic Section Modulus of a rectangular section of width ' $b$ ' and Depth ' $d$ '. Also find the radius of gyration about both the axis for this rectangular section.
(5 Marks)

